Bureau of Epidemiology & Public Health Informatics

Kansas Department of Health and Environment

EPI UPDATES

Volume 5, Issue 8

August 2014

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Kansas Department of Health & Environment

Bureau of Epidemiology & Public Health Informatics

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Answers to Frequently Asked Questions about *Salmonella* and Shiga Toxin-producing *E. coli* Case Investigations

by Lindsey Martin Webb, MPH

Kansas investigates approximately 450 cases of *Salmonella* infection and 100 cases of Shiga toxin-producing *E. coli* (STEC) infection each year. In 2011, 31 counties participated in the Enteric Disease Pilot Project, which involved implementing a hypothesis-generating questionnaire in order to improve the quality of data collected during case investigations. Since 2012, that questionnaire has been used to investigate all *Salmonella* and STEC cases and has led to improved data quality and outbreak response capabilities. Here are answers to some frequently asked questions about these investigations.

- **Why are the questionnaires so long?**

  Salmonella and STEC infections can be acquired from contaminated food or water, contact with an ill person, or direct or indirect contact with an infected animal. Investigators must consider the large number of exposures that may be the source of the infection. Asking about specific items (types of nuts or vegetables, for example) prompts people to recall exposures they might otherwise not consider important.

  In addition to the generally accepted risks like raw chicken or undercooked eggs, outbreaks of salmonellosis have been traced back to items including chia powder, cashew cheese, live poultry, turtles, peanut butter, mangoes, cereal, and dry dog food.

  Likewise, STEC outbreaks have been traced to a variety of sources including sprouts, hazelnuts, bologna, prepackaged cookie dough, frozen food products, lettuce, and salad mixes.

- **Do I have to ask all of the questions if the patient or their doctor thinks they know the source of the illness?**

  Yes. *Salmonella* and STEC bacteria do not produce smells, off-tastes, or changes in the appearance of food – factors that generally lead people to believe a food is suspect. Exposure to food that has been improperly handled will not cause somebody to become ill with *Salmonella* or STEC unless the bacteria were already present in the food. Additionally, most people are unaware of the many possible sources for these bacteria and may not be able to identify risk factors without the prompting that occurs during an interview using the questionnaire. The only way to possibly determine the source of the illness is to conduct a thorough case investigation.

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- **Do I have to investigate if the specimen source for *Salmonella* is NOT stool?**
  Yes. All cases of salmonellosis are investigated the same way, regardless of specimen source. Sources of extraintestinal *Salmonella* infections include cerebrospinal fluid, blood, urine, bile, wounds and abscesses, and the respiratory tract. Blood and urine are the most common extraintestinal sites. Many of these extraintestinal infections do not cause gastrointestinal symptoms. In all cases, *Salmonella* is most often transmitted by food or animal contact so it's important to complete the full investigation even when the specimen source is not stool.

- **Should I start a STEC investigation with just Shiga toxin positive laboratory result or wait for the culture? What if the culture is negative?**
  Most cases of STEC are reported based on a Shiga toxin positive result; culture results may not be reported for 1-2 weeks. Timely investigation of cases is necessary to ensure that accurate and thorough information is collected. Cases should be investigated immediately rather than waiting for confirmatory laboratory results.

  A negative culture following a positive toxin assay could be the result of various factors including improper or delayed shipping of isolates to the Kansas Health and Environment Laboratories. A complete investigation should be conducted for cases with positive toxin assay and negative culture.

- **Do I need to list all potential contacts on the contact tab (classmates, playmates, and household)?**
  For case investigations, a contact is someone who had the opportunity to be infected by the case under investigation. For *Salmonella* and STEC cases, which are spread via fecal-oral transmission, contacts should only be listed if transmission is a possibility (e.g., changing diapers of an ill child).

- **Should I wait to investigate to see if the case is part of an outbreak?**
  No. Conducting timely case investigations is a critical component of identifying an outbreak source. According to the CDC, confirming a case as part of an outbreak typically takes 2-4 weeks. Having case investigation data readily available upon identification as part of an outbreak facilitates a faster investigation. Collecting accurate data becomes more difficult as time passes and memories fade. Delaying case investigations hinders outbreak investigations.

- **Where can I find more information on enteric disease investigations?**
  KS-TRAIN: Enteric Diseases Webinar

Disease Reporting and Disease Control Performance Measures

by Daniel Neises, MPH

Public Health Emergency Preparedness Cooperative Agreement
Capability #13: Public Health Surveillance and Epidemiological Investigation

Selected Diseases:

Disease	Case Classification Criteria
Hepatitis A	confirmed
Salmonellosis	confirmed, excluding typhoid fever
E. coli, STEC	confirmed
Shigellosis	confirmed
Tularemia	confirmed and probable
Varicella	confirmed and probable
Botulism	confirmed, excluding infant botulism
Measles	confirmed
Meningococcal disease	confirmed
Pertussis	confirmed

Disease Reporting: Proportion of selected disease reports received by a public health agency within the awardee-required timeframe. Calculated by using EpiTrax fields:

(Lab Test Date or Date Diagnosed – Presumptive) – (Date Reported to Public Health)
≤ KDHE-required disease reporting timeframe

Disease Control: Proportion of reports of selected disease for which initial control measures were initiated within an appropriate timeframe. Calculated by using EpiTrax fields:

(Date LHD Investigation Started) – (Date Reported to Public Health)
≤ CDC-required timeframe

Disease Reporting

Disease	KDHE Required Timeframe	Statewide Received	Statewide Received On Time	%	% Change From Previous Month
Hepatitis A	7 days	-	-	-	-
Salmonellosis	7 days	48	47	98	-
E. coli, STEC	7 days	9	9	100	-
Shigellosis	7 days	2	2	100	-
Tularemia	7 days	-	-	-	-
Varicella	7 days	3	3	100	-
Botulism	4 hours*	-	-	-	-
Measles	4 hours*	9	8	89	-
Meningococcal disease	4 hours*	-	-	-	-
Pertussis	4 hours*	6	5	83	-

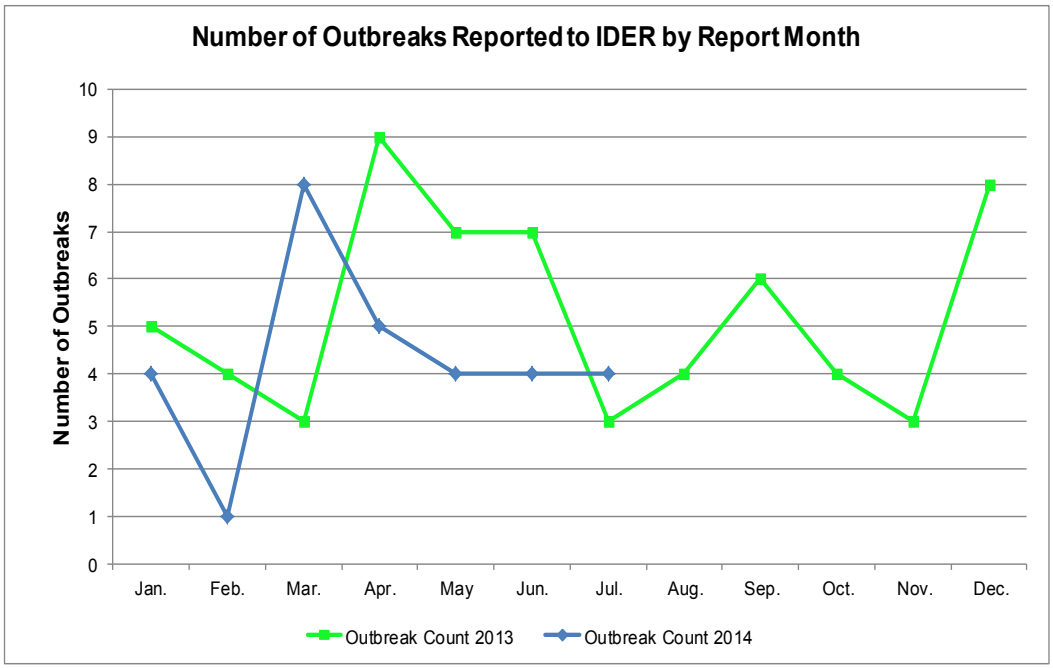
**Because EpiTrax does not capture time reported to public health, KDHE is allowed to "consider cases as immediately reported if the selected case event date and date of first report to a health department occur on the same date."*

Disease Control

Disease	CDC Required Timeframe	Statewide Received	Statewide Investigated On Time	%	% Change From Previous Month
Hepatitis A	7 days	-	-	-	-
Salmonellosis	3 days	48	43	90	-
E. coli, STEC	3 days	9	9	100	-
Shigellosis	3 days*	2	2	100	-
Tularemia	2 days	-	-	-	-
Varicella	1 day*	3	3	100	-
Botulism	1 day	-	-	-	-
Measles	1 day	9	9	100	-
Meningococcal disease	1 day	-	-	-	-
Pertussis	1 day*	6	2	33	-

**Collecting data for these diseases is optional. KDHE has defined these timeframes, not CDC.*

Monthly Outbreak Summaries



Date Reported	Facility Type	Transmission	Disease	County
7/8/2014	Community/Restaurant	Person-to-Person	Measles (rubeola)	Sedgwick
7/18/2014	School or College	Animal Contact	Campylobacteriosis	Riley
7/21/2014	Hospital	Water	Legionellosis	Gove
7/24/2014	Child Care Center	Person-to-Person	Hand, foot and mouth disease	Labette

	Reported Disease Counts - July 2014							
	Not Available	Confirmed	Not a Case	Probable	Suspect	Unknown	Grand Total	3 Year Avg. 2011-2013
Disease	Count	Count	Count	Count	Count	Count	Count	Count
Anaplasma phagocytophilum	1	0	3	1	0	0	**5**	**4**
Arboviral, other	1	0	0	0	0	0	**1**	**0**
Campylobacteriosis	79	8	0	0	3	0	**90**	**77**
Carbapenem-resistant Enterobacteriaceae	0	0	0	0	0	3	**3**	**0**
Chikungunya Fever	1	1	2	0	0	0	**4**	**0**
Cryptosporidiosis	5	1	0	2	0	0	**8**	**8**
Dengue	1	0	0	0	0	0	**1**	**1**
Ehrlichiosis	8	5	9	3	0	0	**25**	**17**
Ehrlichiosis/Anaplasmosis	0	0	0	1	0	0	**1**	**0**
Giardiasis	5	7	0	0	0	0	**12**	**11**
Haemophilus influenzae	1	5	0	0	0	0	**6**	**2**
Heartland Virus	1	0	2	0	0	0	**3**	**0**
Hepatitis A	0	0	2	3	0	0	**5**	**32**
Hepatitis B virus infection, chronic	10	0	60	20	0	0	**90**	**37**
Hepatitis B, acute	0	0	5	1	0	0	**6**	**6**
Hepatitis C virus, past or present	73	32	64	1	9	1	**180**	**265**
Hepatitis C, acute	1	0	0	0	0	0	**1**	**2**
Influenza	0	0	1	0	0	0	**1**	**0**
Legionellosis	5	1	1	0	0	0	**7**	**2**
Listeriosis	2	0	0	0	0	0	**2**	**1**
Lyme Disease	18	1	6	0	1	0	**26**	**38**
Malaria (*Plasmodium spp.)*	0	1	0	0	0	0	**1**	**1**
Measles (rubeola)	15	10	12	1	3	0	**41**	**2**
Meningitis, Bacterial Other	1	0	0	0	0	0	**1**	**2**
Mumps	2	0	0	0	0	0	**2**	**8**
PAM - Primary Amoebic Meningoencephalitis (*Naegleria fowleri*)	0	0	0	0	1	0	**1**	**0**
Pertussis	56	13	10	8	4	0	**91**	**80**
Q Fever (*Coxiella burnetti),* Acute	0	0	2	0	1	0	**3**	**2**
Q Fever Chronic	1	0	0	0	0	0	**1**	**0**
Rabies, animal	19	0	0	0	1	0	**20**	**14**
Rubella	0	0	87	0	0	0	**87**	**0**
Salmonellosis	2	44	0	0	0	0	**46**	**47**
Shiga toxin-producing *E. coli*	4	9	1	0	0	0	**14**	**15**
Shigellosis	8	1	0	1	0	0	**10**	**7**
Spotted Fever Rickettsiosis (RMSF)	32	0	30	16	1	0	**79**	**73**
Streptococcal disease	1	2	0	0	0	0	**3**	**4**
Streptococcus pneumoniae	3	5	0	0	0	0	**8**	**7**
Transmissible Spongioform Enceph	1	0	2	0	0	0	**3**	**1**
Tularemia (*Francisella tularensis)*	8	0	0	0	0	0	**8**	**7**
Vancomycin-resistant *Staphylococcus aureus* (VRSA)	0	0	0	0	0	1	**1**	**0**
Varicella (Chickenpox)	24	0	6	5	0	0	**35**	**48**
West Nile virus non-neuroinvasive disease	1	0	15	0	0	0	**16**	**7**
Grand Total	**391**	**146**	**320**	**63**	**24**	**5**	**948**	**829**

Vaccine-Preventable Disease Surveillance Indicators

Chelsea Raybern, MPH

The completeness and quality of specific surveillance indicators for vaccine-preventable diseases (VPDs) reported to the Kansas Department of Health and Environment (KDHE) from July 1 to July 31, 2014, can be found in the table below. The percentages in bold represent indicators that have less than 90% completion. The case counts presented in this report are preliminary numbers and are subject to change.

Keep up the good work! The indicators date of birth and gender were completed for all VPDs reported from July 1 to July 31, 2014. All of the indicators for measles cases were at least 91% complete, and all but one indicator (completed investigations) were at least 95% complete for pertussis cases.

Still room for improvement…Completeness of onset date, death, and vaccination status was much lower than 90% for more than half of the diseases (*Haemophilus influenzae*, *Streptococcus pneumoniae*, and varicella) reported in July. Except for measles cases, all investigations were less than 90% complete for all diseases. More than half of the indicators for *Haemophilus influenzae* (race, ethnicity, onset date, hospitalization, death, vaccination status, and completed investigations) and varicella (ethnicity, onset date, hospitalization, death, vaccination status, transmission setting, and completed investigations) cases were less than 90% complete. The median number of days for local health departments to accept *Streptococcus pneumoniae* and varicella cases was four with ranges of zero to 13 and zero to 14 days, respectively.

Please continue to focus on completing these fields in EpiTrax for all VPDs as the goal is to reach 90% or higher completion on all indicators. For questions regarding this data, please contact Chelsea Raybern at (785) 296-0339 or craybern@kdheks.gov.

VPD Indicators Reported from July 1 to July 31, 2014 in Kansas

Indicators	*Haemophilus influenzae,* invasive	Measles	Pertussis	*Streptococcus pneumoniae,* invasive	Varicella
Number of reported cases	6	11	79	9	21
% of cases with date of birth	100%	100%	100%	100%	100%
% of cases with gender	100%	100%	100%	100%	100%
% of cases with race	**33%**	100%	95%	100%	90%
% of cases with ethnicity	**33%**	100%	97%	100%	**86%**
% of cases with onset date‡	**50%**	100%	99%	**56%**	**81%**
% of cases with hospitalized noted	**67%**	100%	99%	100%	**81%**
% of cases with died noted	**50%**	100%	100%	**89%**	**86%**
% of cases with vaccination status*	**50%**	91%	99%	**89%§**	**76%**
% of cases with transmission setting¶	N/A**	91%	97%	N/A**	**57%**
% of investigations completed by local health departments§§	**50%**	100%	**89%**	**89%**	**67%**
Median # of days from report to case acceptance (range)¶¶	1 (0-3)	1 (0-7)	1 (0-18)	4 (0-13)	4 (0-14)

‡Data is pulled from onset date field within the clinical tab, not investigation tab.
*Unknown is considered a valid response if patient is older than 18 years.
§Indicator considered complete if either polysaccharide or conjugate pneumococcal vaccine history is documented.
¶Unknown is considered a valid response for this indicator.
**Indicator field is not included in supplemental disease form.
§§Status includes when local health department completes investigation, approves the case, or when the case is closed by state.
¶¶Time is from public health report date to when local health department accepts case.